INDEX.

ABSOLUTE electro-dynamometer, by M. H. Pellatt, 635
Accident from overhead wires, 529
Accomplished at last, 513
Accumulator, The Khotinsky, 572
Accumulators, 574
„ in America, 647
„ Charging, 54
„ Elieson's, 549
„ E.P.S., 645
„ Management of, 531, 549
Adaptation of carbon pencils to different currents in electric lighting, by G. W. Parker, 332
Aerial conductors, The heating of, by electric currents, 185, 379, 493
Alleged frauds on an electric light company, 524
Alternating current apparatus, Measurement of the power absorbed by, 445
Alternating current transformers in Milan, 104
American cable, A new, 144
„ Institute, Electrical section of the, 388, 550
„ patents, 574
„ telegraph arrangements, 117
„ telephone patents, 44, 239, 251, 339, 548, 607
„ telephonic charges, English and, 572
„ view of English electric lighting, 409
„ wire manufacture, 572
Ancient history, 170
„ and modern, 222
Another cable in the Atlantic, 118
Anticosti, 120
Appeals against legal decisions, 120
Arc circuits, Incandescent lighting from, 647
„ lamp, The Ohmart, 297
„ „ indicator, 300
„ „ Pieper's, 2
„ „ Wenzel's, 159
„ lamps in Boston, 199
„ „ for ships, 266
„ „ New method of calculating the candle-power of, 22
„ lighting in Salem, 238
Armature, How to wind an, by R. Fuge, 135
Army telegraphs, 294
Atlantic cable war, 199
Australasian telegrams, 625
Automatic call boxes for telephony, 324
„ make and break for charging accumulators, 54
„ switch for glow lamps, 4
„ telegraphy, The use of condensers in, 231, 267
Averaging up, 169
Ayrton, W. E., and Perry, John, on electromotors and their government, 563

BALL, 410
Bartholdi statue of "Liberty," 240
Batteries, Electromotive force of, 119
„ Primary, 1, 93, 529
„ Secondary, 385, 550
Battery, Dierman's, 94
„ The Dun, 54
„ for electric lighting, The Silvertown, 589
Battery, The gelatine, 336
„ „ Germain, 292
„ „ Lalande-Chaperon, 69, 225
„ „ Maquay, 95, 105, 119
„ „ Pollak, 410
„ „ Regent, 121, 197, 212, 241
„ resistance measurer, 316
„ tester, 240
„ The Upward, 48, 64, 146
„ „ Volta-Pavia, 240
Bell, C. A., The new invention of, 5
Bell-pull switch, A, 312
Bell telephone patent probably broken, 513
Benefit society, An electric light, 240
Bennett, Sir John, on electricity, 552
Berlin Joint Stock Electric Light Company, 450
Binding wires to insulators, Gilbert's improved method of, 637
Birmingham Exhibition, 234, 315, 325, 394
Blackpool electric tramway, 68, 293, 297, 479, 529, 541, 569
Bleaching by electricity, 146
Blenheim's patent telephone, 294
Blowing up a wreck by electricity, 387
Boat, A luxurious, 363
„ An electric, 434
„ „ „ in Berlin, 478
„ Submarine torpedo, 530, 574
Boats, Electrically propelled, 500
Boiler alarm, An electric, 326
Branding sheep by electricity, 95
Bréguet, Life and works of Louis Francois Clement, 77
Brighton Electric Light Company, 476
„ „ railway, 378, 406, 479, 529, 573, 626, 647
Bright platinum plating process, 251
BRITISH ASSOCIATION:—
The, 236, 601
papers, 293
presidential address, 241
Blackpool tramway, The, by M. Holroyd Smith, 286
Bouty, Prof., on electrolytic conductivity, by Oliver Lodge, 566
Cavendish's method, On the proof by, that electrical attraction varies as the square of the distance, by Prof. Poynting, 280
Comparison of Harcourt and Methven photometric standards, by W. Stepney Rawson, 329
Continuity of electric conduction, by Dr. Hopkinson, 474
Contribution to our knowledge of the action of electrolysis on an electrolyte, by Svante Arrhenius, 567
Current weigher for the absolute determination of the strength of an electric current, by Prof. James Blyth, 252
Diathermancy and electrolytic conductivity, by Shelford Bidwell, 492
Distributing electricity by transformers, by Charles Zipernowsky, 303
Dynamos for electro-metallurgy by, Prof. Geo. Forbes, 357
Electric illumination of lighthouses, by Dr. J. Hopkinson, 353
„ lighting at Cannock Chase collieries, by A. Sopwith, 331
„ motor phenomenon, by W. M. Mordey, 259
„ resistance of magnetite, by Prof. Silvanus P. Thompson, 475
BRITISH ASSOCIATION—*continued.*
Electric safety lamps, Improvements in, by J. Wilson Swan, 281
Electrical standards, 303
Electrolysis of silver and copper, by Thomas Gray, 260
Electrolytic work of Kohlrausch, by E. F. J. Love, 474
Employment of alternating currents for measuring liquid resistances, by MM. Bouty and Foussereau, 545
Experiment showing that a divided current may be greater in both branches than in the main, by Lord Rayleigh, 257
Experiments for determining the electric resistance of metals at high temperatures, by J. T. Bottomley, 306
Induction between wires and wires, by W. H. Preece, 306
Lithanode, by Desmond FitzGerald, 279
Magnetic experiment, by W. H. Preece, 286
„ hysteresis, by Prof. G. Forbes, 304
„ observations, Report on, 302
Mechanical and thermal effects accompanying electrolysis, by M. Bouty, 545
Mercurial air pump, by J. T. Bottomley, 306
Miller's portable torsion galvanometer, by Prof. James Blyth, 306
Multiplex telegraphy, by W. H. Preece, 252
Ohm's law in electrolytes, Accuracy of, by Prof. G. F. FitzGerald and Mr. Trouton, 491
Portable electric lamp, by W. H. Preece, 281
Primary batteries, by A. Réné Upward, 264
Secondary batteries, Treatment of, by Bernard Drake and J. Marshall Gorham, 260
Standard sine galvanometer, A new form of, by J. T. Bottomley, 285
Standards of light, Report of the Committee on, 284
Sur la conductibilité electrique des dissolutions salines tres etendues, by M. E. Bouty, 543
Tangent galvanometers, A new scale for, by W. H. Preece and H. R. Kempe, 257
Thermopile and galvanometer combined, by Prof. Geo. Forbes, 284
Variations in the values of some standard resistance coils, by R. T. Glazebrook and T. C. Fitzpatrick, 304
Wheatstone's rheostat, Improved, by Sir William Thomson, 254

British Museum, The, 241
Brush dynamo, The great, 370
„ motor, The new, 395
Brush's colossal dynamo, 250, 370, 537
Bucknill's contact breaker, 541
Buda Pesth electric railway, 646
Business prospects, 501

CABLE, A new American, 144
„ in the Atlantic, Another, 118
„ between Australia and Canada, Proposed, 19

163593

Cable, The Commercial, and the Canadian Pacific telegraph, 314
„ company, The French, 338
„ from France to the West Indies, 120
„ Halifax-Bermuda, 224, 336
„ Havannah-Key West, 362
„ The International, 528, 548, 572
„ „ Lundy Island, 242, 335
„ „ Mackay-Bennett, 362
„ „ Mackay-Bennett and the Canadian Pacific, 170
„ „ Madagascar, 432
„ manufactory, A new, 432
„ New Irish Sea, 224, 528
„ New Zealand, 455, 497, 502, 528
„ protection, 294, 314, 549, 571
„ rates, Atlantic, 95
„ „ Reduction in, 20, 243
„ „ relic, 92
„ the Scilly, Restoration of, 432
„ ship *International*, 500
„ „ *Monarch*, 548
„ subsidy, The New Zealand, 455, 497, 502, 528, 645
„ subsidies, Proposed conference on, 571
„ traffic, Atlantic, 432
„ war, The Atlantic, 199, 477
Cablegrams, Colonial, 242
„ Continental, 243
Cables, Brazilian and West Indian, 92
„ Eastern, 386
„ French, 19, 45, 67, 117, 338, 409, 455
„ Irish, 528
„ of the world, 67
„ Protection of submarine electric, 294, 314, 549, 571
„ Transatlantic, 352
„ West African, 21, 45, 53, 117, 145, 170, 224, 239, 292, 336, 362, 499
Calculations extraordinary, 601
Calibration of a Cardew voltmeter, 132
Callender-Webber conduit, The, 434
Callender's conductors, 433
Candle-power of arc lamps, New method of calculating the, 22
Capel-Court curios, 213
Carbon filaments, Lamps with, 327
„ pencils, The adaptation of, to different currents, 332
Carbons for incandescent lighting, by A. S. Hickley, 310
Cardew voltmeter, Calibration of a, 132
Case, Williard, on a new means of converting heat energy into electrical energy, 210
Castle dynamo, The, 539
Centenary of Galvani's discovery, 292
Central stations, Power from, 83
Champion telegraphist of the world, 224
Changing chairs, 118
Charge of tampering with telegrams, 530
Charitable telegraphists,
Charity commission and technical education, 240
Charles L. Baker and Co., 316
Charterhouse Science and Art School, 314
Chelsea Electric Lighting Act, 492
Chemical nuisance, 531
Chronometer with magnetic escapement, 2, 68
City and Guilds of London Institute, 95
„ „ of London Technical College, Finsbury, 364

CITY NOTES—
African Direct Telegraph Company, 243
Anglo-American Telegraph Company, 97, 98, 149, 411
Australasian Electric Light, Power and Storage Company, 22, 243
Blackpool Electric Tramway Company, 552
Brazilian Submarine Telegraph Company, 126, 390, 436, 480, 575
Brighton Electric Light Company, 480
Cassel Gold Extracting Company, 458
Commercial Cable Company, 604
Consolidated Telephone Construction and Maintenance Company, 458
Cuba Submarine Telegraph Company, 151, 173
Direct Spanish Telegraph Company, 317, 365, 410
„ United States Cable Company, 70, 124, 151, 411

CITY NOTES—*continued.*
Eastern Extension, Australasia and China Telegraph Company, 98, 341, 411, 435, 436, 628
„ and South African Telegraph Company, 23, 532, 628
„ Telegraph Company, 23, 70, 96, 125, 365
Edison and Swan United Electric Light Company, 121
Electro-Amalgamator Company, 628
Globe Telegraph and Trust Company, 23, 70, 98, 125, 148, 390
Great Northern Telegraph Company, 23, 243, 575, 628
Gülcher Electric Light and Power Company, 627
India Rubber, Gutta Percha and Telegraph Works Company, 70, 97
Indo-European Telegraph Company, 317, 390
Lancashire and Cheshire Telephonic Exchange Company, 200
London Platino-Brazilian Telegraph Company, 243, 504
Maxim-Weston Electric Company, 339, 390, 604
National Telephone Company, 125, 151, 174
New Telephone Company, 628, 648
Pilsen-Joel and General Electric Light Company, 458, 503, 648
Reuter's Telegram Company, 341
River Plate Telephone and Electric Light Company, 317, 553, 628
South of England Telephone Company, 151, 173, 553, 604
Spanish National Submarine Telegraph Company, 575
Submarine Cables Trust, 365
„ Telegraph Company, 98, 124, 150
Telegraph Construction and Maintenance Company, 98, 436
Telephone Company of Austria, 436, 648
United River Plate Telephone Company, 649
United Telephone Company, 22, 48, 390, 481
West African Telegraph Company, 49, 70, 243, 295
„ Coast of America Telegraph Company, 23, 243, 648
„ India and Panama Telegraph Company, 436, 481, 502, 575
Western Counties and South Wales Telephone Company, 98
„ Union Telegraph Company, 295

Civic expenses, 242
Clark cell as a standard of electromotive force, 613
„ dynamo, The, 514
Clark's standard cell, 549
„ „ „ An improved, 301
„ standard cell, Temperature coefficient of, by Arthur Dearlove, 560, 611
„ transit tables, 600
Cocoa-nut palms and lightning, 181
Colliery explosion, 145
Colonial cablegrams, 242
„ telegraphs, 66
Colossal dynamo, Brush's, 250, 370, 537
Commercial cable and the Canadian Pacific telegraph, 313
„ efficiency of dynamo machines, 424
Communication with light ships, 317
Comparison between the different systems of transmitting motive power, 419
Compass errors, 388
Compound wound dynamos, 53
Compressed air and electric lighting, 588
Condensers, The use of, in automatic telegraphy, 231, 267
Conductors, Electrical, 560
„ for incandescent lighting, Size of, 157
„ Underground, 417
Conduit, Electrical subway, in New York, 418
Conference on cable subsidies, Proposed, 571
„ on the protection of submarine cables, Proposed, 571
Congregation in the dark, A, 198
Conservation of energy, 145
Consolidated Telephone Construction and Maintenance Company, 432
Consumption of certain products from the Cowles electrical furnace, 372
Contact breaker, Bucknill's, 541
„ detector, A valuable, 363
Continental cablegrams, 243
Continuous action magnetic separator, 159
Continuous-current transformers, The origin of, 613
Contrast, A, 502
Conversazione at Finsbury Technical College, 46
Converting heat energy into electrical energy, 210
Correction for resistance coils, 84

CORRESPONDNCE—
Administration and working of the British telegraph system, by "Telegraphist," 582, 606
All is not gold that glitters, by "Electron," 75
Arc lamp patents, by Alfred Shedlock, 296
Arc lamps, by James Brockie, 204
Bell's telephone patents in the United States, by W. C. Barney, 75
Bleaching by electricity, by Paterson and Cooper, 51
Bourseul's telephone, by W. C. Barney, 367, 629
Calibration of voltmeters, by "Ajax," 202, 319
„ „ by "Volt," 247
„ „ by J. G. Statter, 271
Campbell-Swinton's book, by A. A. Campbell-Swinton, 24
Chemical action in the Upward battery, by R. Frederick Yorke, 296
Chlorine batteries, by W. E. Berliner, 178
Claims of a telephone company, by A. B. Chalmers, 24
Clark's standard cell, by "Ajax," 581
„ „ „ by Arthur Dearlove, 606
Clerk gas engine, by Dugald Clerk, 99
Commercial efficiency of dynamos, by Alexander P. Trotter, 437
Constant currents for electric lighting, by Edward Conry, 25
Cost of primary batteries, by F. Tremain, 272
„ „ „ „ E. C. Davis, 296
„ „ „ „ Wm. Webster, jun., 296, 319
Courtesies of scientific journalism, by Sydney F. Walker, 248
Critical speed of dynamos, by Silvanus P. Thompson, 101
„ „ „ „ Sydney F. Walker, 128
Dierman's cell, by C. W. S. Crawley, 204
Distribution of power, by H. Serrin, 405
Dynamo testing, by A. P. Trotter, 484
„ „ „ P. Cardew, 510
Edison-Swan meeting, by John Bilton, 154
Electric cars, by M. Holroyd Smith, 629,
„ Locomotive and Power Company by Radcliffe Ward, 412, 455
„ „ and Power Company, by C. P. Elieson, 437
Electric light *v.* paraffin, by Wolf Defries, 650
Electrical experiment, by Heinrich Discher, 296
„ „ „ Arthur Willey, 319
„ formulæ, by J. Pigg, 343, 368
„ light and photographic transparencies, by "An Eye Witness," 557
„ measuring instruments, by J. L. Huber, 26
Electricity *v.* heat, by James Johnstone, 24
Electro-motors, by "A Student," 76, 126
„ „ „ W. M. Mordey, 100
„ „ „ George Hookham, 101

CORRESPONDENCE—*continued.*
Electro-motors and their government, by "W. E. A. and J. P.," 606
English telephone patents, by "Telephonist," 75
Ferranti transformers, by Campbell Reeves and Hooper, 464
Gas engine patents, by Crossley Brothers, 128
„ works and electric light at Hastings, by "Electrical," 557
Generators and motors, by George Hookham, 128
Government of electro-motors, by W. M. Mordey, 176
Hastings and St. Leonards Electric Light Company, by E. W. Hennah, 202
House's patent telephone of 1868, by Silvanus P. Thompson, 557
How to wind armatures, by A. Jones, 177
„ „ „ „ Richard P. Fuge, 319
Hughes, Prof., on self-induction, by D. E. Hughes, 74
Incandescent lamp monopoly by Lawrence Opermann, 416
„ „ monopoly, by Hine and Urquhart, 463
„ „ monopoly, by Major-Gen. C. E. Webber, 501
„ „ patents, by Sydney F. Walker, 179
„ „ patents, by Henry F. Crewe, 180
„ „ patents, by E. Garcke, 180
„ „ patents, by John Bilton, 247
„ „ patents, by James and James, 415
„ „ patents, by Arthur Shippey, 437
„ lamps, by James and James, 484
Insurance companies and electric lighting by "Resistance," 463, 510
„ „ and electric lighting, by H. Bury, 510
„ „ and electric lighting, by "Experientia," 483
„ „ and electric lighting, by R. E. Crompton & Co., 484
Intercommunications in trains, by J. D. Leech, 24
Jarman's electrical tramcar, by A. J. Jarman, 484
Judges, experts and patents, by Silvanus P. Thompson, 178
Knockover switch, The, by Killingworth Hedges, 24
Law of winding for self-regulating motors, by Silvanus P. Thompson, 534
Lippmann's current meter, by "E. S." 99
Lithanode, by W. Hibbert, 557
Long distance telephony, by C. H. Haskins, 24
Mackay-Bennett cables, by Cte. A. Dillon, 175
Magnetic fields, by "G. E. D.," 509
„ „ „ Mather and Platt, 483
Management of accumulators, by Sir David Salomons, 581
Marchant engine, by R. E. Crompton, 320, 438
„ „ „ Radcliffe Ward, 338
„ „ „ Wm. H. Massey, 343, 367, 392, 438
„ „ „ Albert H. Howard, 367
„ „ „ William Downie, 367, 438, 463
„ „ „ "Twister," 392, 439
„ „ „ "The Writer of the Article," 412
„ „ „ R. M. Marchant, 412, 438, 439, 461

CORRESPONDENCE—*continued.*
Marchant engine, by James Fraser, 414, 460
„ „ „ A. Reckenzaun, 414
„ „ „ "Millwright," 460
„ „ „ William Granger, 460
„ „ „ "G. A. W.," 462
„ „ „ H. R. Kempe, 483
Measurements in alternating current circuits, by G. Bowron, 484
Menace to electric lighting, by Charles Lever, 73, 102
More plums from the Law Courts, by "L'Homme Qui Rit," 99
New scale for tangent galvanometers, by A. Eden, 320, 368
„ „ „ „ galvanometers, by Jas. Swinburne, 344, 391
„ „ „ „ galvanometers, by Sydney Evershed, 344
„ „ „ „ galvanometers, by J. Rennie, 416
"Nothing new under the sun," by J. W. Giltay, 272
Patent law, by "J. A. S," 320
„ Office and new patents, by Arthur Shippey, 392
„ „ „ „ patents, by Thos. J. Handford, 416
Patents for dynamos, by G. Bowron, 343
„ „ „ „ S. P. Thompson, 368
Plums from the Law Courts, by "l'Homme Qui Rit," 630
Pollak battery, The, by G. Bingswanger, 437
Primary batteries, by Radcliffe Ward, 23
„ „ „ Sydney F. Walker, 52, 72, 100, 127
„ „ „ W. De Fonvielle, 153
„ „ „ J. W. Dierman, 176
„ „ „ Henry T. Crewe, 344
Proof of Wheatstone bridge, by Sir David Salomons, 247
Prospectus of the Regent Portable Electric Lamp and Lighting Company, by Radcliffe Ward, 246
Regent primary battery, by "Shunt-wound," 270
„ „ battery, by George Edward Smith, 271
Remarkable incandescent lamp patents, 204
Secondary batteries, by John S. Sellon, 415
„ generators, by Rankin Kennedy, 392, 509
„ „ „ Charles Zipernowsky and Max Deri, 464
„ „ „ Campbell Reeves and Hooper, 510
„ „ „ Alexander Bernstein, 534
Simple alarum, by Alfred S. Giles, 128
„ make and break, by Sir Charles T. Bright, 272
„ „ „ „ „ R. Snyers, 391
„ „ „ „ „ B. Bachmeyer, 437
Skew tangent scale, by "Subscriber," 368
Submarine cables, by "H. G. G. S," 416
Telephone circuit for speaking condensers, by J. W. Giltay, 484
Telephonic repeaters, by Thomas D. Lockwood, 203
Telephonic translators, by A. R. Bennett, 76, 247
Testing dynamos, by P. Cardew, 464
„ „ „ Jas. Swinburne, 534
Threatened incandescent lamp monopoly, by "Lux in tenebris," 176
Threatened incandescent lamp monopoly, by Wm. Le Fevre, 245

CORRESPONDENCE—*continued.*
Threatened incandescent lamp monopoly, by "Interested," 440
Tramway gradients, by F. Tremain, 581
Upward battery, by A. Réné Upward, 23, 51, 74, 200, 228
„ „ „ J. W. Dierman, 51, 100
„ „ „ C. W. S. Crawley, 100, 127, 180, 228, 271
„ „ „ A. W. Bennett, 127
„ „ „ Sydney F. Walker, 154, 202, 247
„ „ „ J. W. King, 177, 271
„ „ „ Henry Cunynghame, 201
„ „ „ Edward Conry, 201
„ „ „ N. G. Thompson, 271
„ „ „ R. Fredk. Yorke, 296
Warning to inventors, by M. Holroyd Smith, 558
Watt and the Joule, by Desmond G. Fitz Gerald, 154
Welding by electricity, by J. B. Duncan, 368, 509
„ „ „ „ R. Gardner, 391
„ „ „ „ Elihu Thompson, 464
„ „ „ „ "Y. O. Y," 534
„ „ „ „ Radcliffe Ward, 558
„ „ „ „ H. Thame & Co., 573
What is a filament? by "Filacer Filacium," 203
Why burn oil? by "Atom," 630
„ „ „ by "Acid," 650
Wild scheme, A, by "X. X.," 581
Work performed in telegraphing, by "Ita. MR.," 76, 128, 171
„ „ „ telegraphing, by W. Moon, 99, 154

Cowles electrical furnace, The consumption of certain products from the, 372
Cremation by electricity, 551
Critical speed, 53, 146
Crompton's works, Messrs. 574
Crookes's new paint, 363
Cross, Chas. R., and Shepard, Wm. E., on the inverse E.M.F. of the voltaic arc, 298, 321
„ „ on experiments on the melting platinum standard of light, 426
Curious effect, 119
Cuttriss siphon vibrator for ocean telegraph cables, 103

DAFT locomotives at Baltimore, 240
„ motor and electric railway, 425
Dangers with frictional electricity in blasting, Unsuspected, 537
„ of overhead wires, 293
Davey-Paxman engine trial, 522
Deaf telephone ear, 144
Dearlove, Arthur, on the temperature coefficient of Clark's standard cell, 560, 611
Death by lightning, 67
Demagnetisation of watches, 403
Deposition of dust and smoke, Electrical, 422
Deprez, M. Marcel, on the experiments communicated by M. Fontaine on the transmission of power, 469
„ Experiments of M. Marcel, relating to the transmission of power, 163, 190, 215
Dielectrics, Specific inductive power and conductivity of, 615
Dierman's battery, 94, 148
Different systems of transmitting motive power, 419
Dilatory telegraphing, 339
Dioptric glass, Trotter's, 433
Directors and proxies, 119
Distribution of electricity by underground conductors, 422
„ of power, 407, 433
Distributor box, The Sun, 95

Dolbear, Prof. A. E., on early telephonic apparatus, 346
Domestic electric lighting, 44, 196, 376 499, 501
Dun battery, The, 54
Duplex, New use of the, 527
Dynamo, Brush's colossal, 250, 370, 537
„ characteristics, Predetermination of, 485
„ The Castle, 539
„ „ Clark, 514
„ construction, 500
„ electric machinery, 315, 339, 471, 489, 519
„ „ machines, On the intensity of the magnetic field in, 448
„ The Goolden-Trotter, 268
„ „ great Brush, 370
„ A large, 477
„ machines, The commercial efficiency of, 424
„ The Short, 69
„ „ Siemens, 433
„ Strange history of a, 14, 43
„ testing, 572
„ The Thomson incandescent, 373
Dynamos, Edison-Hopkinson, at the Indian and Colonial Exhibition, 120
„ Franklin Institute tests of, 515
„ "Idle wire" on, 155
„ Regulation of, by the movement of the commutator, 350
„ Testing, 640

EARLY telephonic apparatus, by Prof. A. E. Dolbear, 346
Earth currents, 121
Earthquakes in America, 242
Eastern cables, 386
„ telegrams, 292, 314
Edinburgh Exhibition, 362, 434, 451
Edison central stations, 251, 551
„ Company and users of incandescent lamps, 41, 67, 118, 119
„ filament case, The, Jas. Swinburne on, 129
„ incandescent lamp patents, 625
Edison-Hopkinson dynamo, 120
Edison and Swan United Electric Light Company, 198
Edison-Swan Company's report, 120
Effect of D. T., 408
„ of lightning on human beings, 182
Efficiency of double belts, 647
„ of transformers, 80

ELECTRIC—
bell fitting and maintenance, 292
„ imposter, 573
boat, An, 434
„ in Berlin, 478
boiler alarm, 326
buoy, 477
car, Throwing stones at an, 145
clock, A monster, 364
clocks for South America, 600
currents, The heating of ærial conductors by, by Gilbert White, 185, 379, 493
fire alarms at Dundee, 388
gong, 528
governor, The Porte-Manville, 183
lamps, Settle's patent, 646
launch in France, An, 624
„ A new, 170, 198
„ trial trip, 172
launches, 478
„ on the Thames, 46
lighthouses, 569
locomotion, 21, 573, 637
„ in America, 94, 602
„ for railways in France, 600
Locomotive and Power Company, 374
log, An, 347
Miners' lamp, 144, 225, 453
motor, 47
motors in America, 336, 427, 487
„ for printing, 386
night signalling, 364
novelty for the Brussels Exhibition, 388
organ, An, 294
railway at Blackpool, 68, 293, 297, 479, 529, 541, 569
„ „ Brighton, 378, 406, 479, 529, 573, 647
„ „ Buda Pesth, 646
„ The Daft, 425

ELECTRIC—*continued*
railway at Littlehampton, Proposed, 387, 408
„ „ Margate, 531
„ „ Minneapolis, 94
„ „ Mödling-Hinterbruhl, 470
„ „ Ryde, 293
„ The Schlesinger, 477
„ „ Sprague, 398
„ systems, 293
„ on the Trachenberg mountain, 529
roads in America, 44, 477
safety lamp for miners, Swan's, 386
search light, Submarine, 453
shock, Fatal, 407
soldering iron, 573
spectacles, 549
street cars, 619, 625
submarine boat, 530, 574, 618
subway conduits in New York, 418
thermometry, 326
tramway bill, An, 551
tramways coming, 535
„ in Paris, 647
tricycle, 95
wire, Improvements in, 198

ELECTRICAL—
appliances, Medical, 199
„ for railways, 302
circuits, 592
clock, 500
communication in the navy, 337
conductors, 560
„ in New York, 409
dental appliances, 225
deposition of dust and smoke, 422
distribution, 433
exhibits at the Leicester Exhibition, 118
engineering football club, 549
"in" or "out" indicator, 79
journal, A new, 171
journalism, 624
measuring instruments, 22
metronome, 624
power, New application of, 47
„ Thrashing corn by, 267
progress in America, 386
propulsion, 145
resources of the Royal Navy, 114
rivetting machine, An, 434
Section of the American Institute, 388
staff at Sheerness dockyard, The permanent, 170
testing apparatus, 159
traction, 501
tramcar, An, 387
„ efficiency, 225
„ system, Jarman's, 423
tramways at Brussels, 374
transmission of power, 118, 171
„ „ in New Zealand, 134, 145
„ of speech, 348
work in workhouses, 293
Electrically propelled boats, 500

ELECTRIC LIGHT—
All on account of the, 21
appliances, Kennedy's, 551
benefit society, 240
at a bicycle club concert, 454
cable, 293
„ joints, Good, 433
challenges, 476
company, Alleged frauds on an, 524
companies dividend, 266
on the dining table, 21
distribution, 551
engineering, 386
and the eye, 311, 432
on ferry boats, 69
Fire caused by the, 335
fittings, 361
and gas companies, 144
Gas works and the, 527
at Hell Gate, 527
in the Indian marine service, 238
machinery, 242
motor and fire engine combined, 87
at a musical festival, 144
Natural water power and the, 552
and naval warfare, 205
A new, 477
obstinate, The, 312
v. paraffin, 583
in Parliament, 208

ELECTRIC LIGHT—*continued*
Pearl fishing by the, 598
and photographic transparencies, 531
plant, Sale of, 334
pole, Wrong use of an, 221
rivalry in America, 407
semaphores, 407
station destroyed, 294
stations in New York, 238
on the Suez Canal, 3, 65
switch, 549
„ Preece and Willmot's, 541
„ Thorpe's new, 646
in theatres, 37
The Thomson-Houston, 406
and torpedo defence, 624
to the rescue, 69
at the Vatican, 453
wires, Underground, 222

ELECTRIC LIGHTING—
Act, 361, 527
„ Chelsea, 492
„ Committee, 165
The Admiralty and, 171
in America, 598
American view of English, 409
of the Athenæum Club, 454
in Austria, 531
in Bangor, Me., 222
at bazaars, 527, 571
of Bergen, 267
in Berlin, 453, 454
at the Bingley Hall Exhibition, Birmingham, 234, 394
at Birkdale, 18
in Birmingham, 526
of the Birmingham Art Gallery, 266
in the Black Forest, 311
in Boston, 199
at Bournemouth, 266, 291, 339, 454
at Bradford, 454, 527
at Brighton, 44, 169
at the Brighton Pavilion, 645
on the Brighton railway, 498
of the British Museum, 241, 335, 526, 549
in Brussels, 66
at Burnley, 406
of calico print works, 170
canals, 238, 498
Central station, at Bergen, 232
„ „ in Sheffield, 548
„ „ in Vienna, 144
„ stations, Edison, 251, 551
of churches, 117, 144, 362, 457, 498, 570
in the City, 141, 242, 527
in City offices, 265
at Colchester, 19, 335, 453
Compressed air and, 588
in Cornwall, 197
in Corea, 238
of country houses, 266, 527
of Covent Garden Theatre, 94, 117, 196
„ „ Circus, 529
of the Crystal Palace, 69
of Dalton-in-Furness, 266
of the Dardanelles, 529
by day, 599
Domestic, 44, 196, 376, 499, 501
at Eastbourne, 19, 169, 213
at the Edinburgh Exhibition, 362
at Elswick, 114
Engines for, 66, 225, 232, 312
at exhibitions, 279
expenses, 235
Experiments in, 68
extension, 526
Fire and life risks in, 590
of flour mills, 92
at a flower show, 216
in France, 466, 530, 645
of the Gaiety Theatre, 266
v. gas, 222, 498, 531
Gas engines for, 458
in Germany, 476, 623
on the Glasgow underground railway, 222
at Great Grimsby, 406
of the Grosvenor Gallery, 434, 574
from the Grosvenor Gallery, 600, 646
at Halifax, 361
at Hanley, 385, 453
at Harrogate, 198
at Hastings, 169, 265
Hint for, 455
of hotels, 334
House to house, 570
at Hove, Proposed, 209

ELECTRIC LIGHTING—*continued*
industry in Berlin, Present position of, 526
installation in existence, The oldest, 362
as an investment, 223
of the Kensington Agricultural Hall, 477
at Kettering, 56
at Leamington, 645
at the Leeds municipal festival, 169, 291
of the "Liberty" statue, 240, 476, 526
licenses, 44
of lighthouses, 334, 598
of lightships, 267, 361
at Lindal Moor, 547
at Liskeard, Proposed, 334, 385, 570, 623
of the Liverpool Exhibition, 120, 351
of Liverpool streets, 526
in Londonderry, 598
at Marseilles, 453
Menace to, 27
of the *Mersey*, 66
by meter in London, 499
in mills, 291
in Montreal, 230
in the Navy, 18, 92, 269, 432, 454, 498
in New England, 222, 238
„ „ Jersey, 222
of the New Stone Buildings, 574
in New York, 378
at the Newcastle exhibition, 290, 548
at the North British and Mercantile Insurance Company's office, 498
in North Staffordshire, 498
in the Northern Counties, 223
Novel idea of, 335
of offices, 92
of an oil steamer, 290
at Okehampton, 623
of the *Orinoco*, 498
of the *Orizaba*, 385
of the Palais Royal Theatre, Paris, 385
of the Paris Opera House, 170
of Peter Robinson's, 361
and photography, 196
plant for Egypt, 316
at Plymouth, Proposed, 598
at Portsmouth, 238, 644
of Portsmouth dockyard, 547, 644
in the Post Office, 291
by primary batteries, 232
for private houses, 148
progress, 431
prospects, 321
of the Prudential Assurance Company's offices, 452
reliable, Is, 559
at the Royal Courts of Justice, 291
on Russian farms, 530
of St. James's Hall, Piccadilly, 600
at Salem, 238
at the Saltaire Palace of Delight, 197
of the San Carlo Theatre, Naples, 570
in Sheffield, Central station, 548
of ships, 266, 335, 362, 431, 498, 547
of ships for navigating the Suez Canal by night, 466
stations, Mutual insurance of, 144
of the statue of Liberty, 408
of steel works, 114
at Stockport, 335
of streets, 598
of streets in France, 466
in South America, 238
at Taunton, 94
at Tavistock, Proposed, 386, 454, 526
of Temple Church, 457, 570
Temporary, 69, 144, 147, 598, 624, 644
of theatres, 312, 623
of the Tilbury Docks, 562
of Tivoli, 291
at Todmorden, 95
of towns on the Continent, 92, 526, 645
of trains, 453, 498, 526, 623, 644
at Trinidad, 454
of underground railways, 547, 623
in the United States, 65
by water power, 385, 498
Utilisation of wind power in, 143
of the Vienna Opera House, 550
of Wentworth Castle, 406
Wind motor for, 644
of workshops, 624
A year's, 625
in Yorkshire, 431
at the Yorkshire College, 431
Electrician gone mad, 549
„ in trouble, An, 198
Electricians, Honours to, 93, 550

ELECTRICITY—
as applied to markmanship, 145
in blasting, Unsuspected dangers with, 537
at the Birmingham Exhibition, 234
Bleaching by, 146
Blowing up a wreck by, 387
Branding sheep by, 95
Cremation by, 541
Curing corns by, 42
Distribution of, by underground conductors, 422
Extracting metal by, 22
and the Falls of Clyde, 68
Gas and, in Paris, 226
„ „ oil, 337
Generalising, 363
Institute of Civil Engineers and, 336
at the Jubilee Exhibitions, 625
and horses, 388
Killed by, 573
in the navy, 93, 292, 410, 457, 600
New experiment in static, 349
for nothing, 181
Operating an organ by, 47
at the Paris Exhibition of Sciences and Industrial Arts, 625
and the printing press, 387
Printing by, 600
and railway working, 511, 540, 584, 632
at the Sanitary Exhibition, 333
Sewage pumping by, 602
and shafting, a simile, 55
Sir John Bennett on, 552
Shot firing in mines by, 82
Soldering by, 624
at Southampton Ordnance Surrey Offices, 268
for therapeutical purposes, 601
Timing bicycle races by, 86
Train signalling by, 339
and tramways, 640
Welding by, 274, 601
at the Yorkshire College, 291
Electro-deposition, Forming metal sheets by, 47
„ „ of metals, 317
„ dynamics, Researches in, 550
„ dynamometer, An absolute, 635
„ metallurgy, 500
Electromotive force, 599
„ „ of batteries, 119
Electro-motor, Prize competition for the best, 142, 160
„ „ The Stockwell, 422
„ motors, 28, 457, 573
„ „ and generators, 447, 455, 479
„ „ and their government, by Profs. Ayrton & Perry, 563
„ „ and their government, by W. M. Mordey, 609
„ „ for railways, 119, 147, 171
„ osteotome, 551
„ plating, 292, 601
„ pneumatic transmission, 602
Elieson's accumulators, 549
Engine, Another petroleum, 499
„ The Etève petroleum, 386, 408
„ made by Davey-Paxman, Trial of an, 434, 522
„ The Marchant, 119, 240, 275, 294, 345, 363, 424, 441, 457, 475, 479
„ Spiel's petroleum, 456
„ stationary steam, New long stroke expansion, 207
Engines for electric lighting, 66, 225, 232
English telephone patents, 1
„ telephonic charges, American and, 572
Equipment of laboratories, 646
Etève-Hume's petroleum engines, 386, 408
Examinations, Technological, 171
Exchange Telegraph Company and the Stock Exchange, 336
Exhibition, The Birmingham, 234, 315, 325, 394
„ The Edinburgh, 362, 434, 451
„ An Electric Telegraph Jubilee, 574
„ The Glasgow (1888), 408, 456
„ International Telephone, 455
„ The Leicester, 118
„ The Liverpool, 120, 351, 407, 430
„ The Manchester Jubilee, 334, 434, 456
Exhibition, The Newcastle, 241, 290, 458, 548
„ at the Palais de l'Industrie, Paris, 231, 625
„ The Paris Universal, 240, 434
„ The Saltaire, 455, 500
„ The Sanitary Institute, 500
„ A Spanish International, 387
„ The Stockholm, 146
Exhibitions, The electric light at, 279, 625
Expected fusion of companies, 434
Expensive mistake, An, 499
Experiment in static electricity, A new, 349
Experiments with alternating current transformers at Milan, 104
„ „ electric lighting, 68
„ „ lycopodium, 41
„ „ the melting platinum standard of light, 426
„ of M. Marcel Deprez relating to the transmission of power, 163, 190, 215, 469
„ on transformers of electric energy, 351
„ on the transmission of power, 450
Explosion in a colliery, 145
Extracting metal by electricity 22

FATAL electric shock, 407, 549
Ferranti transformers, 456
Field sextuplex telegraph, 587
Finsbury special courses, 478
„ Technical College, 242
Fire at electric light works, 120
„ „ „ telegraph works, 365, 388
„ „ „ wire works, 46
„ engine and electric light motor, Combined, 87
„ insurance and electric lighting, 456
„ and life risks in electric lighting, 590
„ extinguishers, 528
Fires at Hampton Court Palace, 527
Fontaine, M. Hippolyte, on experiments on the transmission of power, 450, 541
„ M. H., Experiments communicated by, on the transmission of power, 469
Football club, Electrical engineering, 549
Footstep for telegraph posts, Gilbert's, 377
Forecast, A, 631
Foreign electric light companies' dividends, 266
„ honours to English and American scientists, 170
Formation and fixation of magnetic curves, 229
Forming metal sheets by electro-deposition, 47
Franklin Institute Journal, 599
Frauds on an electric light company, Alleged, 524
Freak of fortune, 268
Freaks of a flash of lightning, 242
French, E. L., on a relation between magnetising force and core of magnet, 634
„ cables, 19, 45, 67, 117, 338, 409, 455
„ telephones, 44
Fruit as food, 146
Fuge, R., on How to wind an armature, 135

GALE and telegraphic communication, 571
Galvani's discovery, centenary of, 292, 329
Galvanometer needle, 409
„ New mirror, 57
„ To adjust tangent,
„ The tangent, 388
Galvanometers, New scale for tangent, 294
Gas abandoned, 526
„ and electrical engineers, 601
„ „ electricity in Paris, 226
„ electricity, and oil, 337
„ engine, The Glasgow, 451
„ engines, 267, 293, 556
„ „ for electric lighting, 458
„ explosions, 239, 364, 409, 456, 457, 531, 624
„ Raising the price of, 573
„ works and the electric light, 526
Gaulard-Gibbs transformers, 592
Gelatine battery, 336
Generalising electricity, 363

Generators, Electro-motors and, 447
„ Secondary, 78
German Edison Company, 225
Ghost, A, 572
Gilbert's improved footstep for telegraph and signal posts, 377
„ „ method of binding wires to insulators, 637
„ „ single needle instrument sounders, 446
Glasgow Chamber of Commerce, 600
„ College of Science and Arts, 387
„ gas engine, 451
„ Jubilee Exhibition, 408, 456
Glass decoration, 417
Glow lamp monopoly in Germany, 434
„ lamps, 93, 573, 593
„ „ Automatic switch for, 4
„ „ The Lodyguine, 93
Gold in Paris streets, 529
Good proposition, 549
Goolden-Trotter dynamo, The, 268
„ „ patent regulator, The, 289
Government and the Post Office, 148
„ „ Telephone Company, The, 148
Governor, The Porte Manville electric, 183
Gravier's experiments on dynamo machines, 46
Great Brush dynamo, The, 370
Great Eastern, The, 119
Guaranteed circulations, 171
Gülcher Company, The, 433, 640
Guthrie, Portrait of Dr., 529
Gutta percha, 86

HAIRDRESSING, Luxurious, 432
Hale, Wm. H., on the Colossus dynamo at work, 537
Heat cell, The, 225
Heat and cold, Influence of alternate, on metals, 6
Heat indicating paint, 239
Heating of ærial conductors by electric currents, by Gilbert White, 185, 379, 493
Henley's telegraph works, 293
Hickley, A. S., on carbons for incandescent lighting, 310
High insulation, 225
„ praise for motors, 434
„ resistance lamps, 241
Hint for electric lighting, 455
„ to Penzance, 453
His own enemy, 408
Home Rule, The right kind of, 119
Honours to electricians, 93, 550
Hopkinson, J., and Hopkinson, E., on dynamo-electric machinery, 471, 489, 519
House to house lighting, 570
Houston, Prof. Edwin J., on the Reis articulating telephone, 29
How to wind an armature, by R. Fuge, 135
Hundred years ago, A, 329

"IDLE WIRE" on dynamos, 155
Illuminated fountain, The great, at Staten Island, 88
Illumination of the Dardanelles, 529
Immisch motor, The, 457, 465, 469
Imperial communications, 242
„ federation, 147
Important patent, 501
Improved footstep for telegraph posts, Gilbert's, 377
„ single needle instrument sounders, Gilbert's, 446
„ Thomson's "little" siphon recorder, 56
Improvements in electric wire, 198
"In" or "out" indicator, An electrical, 79
Incandescent dynamo, The Thomson, 373
„ lamp appeal, 241
„ „ A large, 337
„ „ leads, 499
„ „ lighting from arc circuits, 647
„ „ litigation, 397
„ „ makers, 172
„ „ monopoly, 120
Incandescent lamp patents, 7, 38, 47, 53, 59, 89, 95, 109, 119, 138, 160, 194, 216, 226, 235, 387, 389, 396, 479, 572, 596, 621, 647
„ „ patents in America, 66, 69
„ „ Priority of the, 239, 637
„ „ Trade combination, 431
„ lamps, 171
„ lighting, Carbons for, by A. S. Hickley, 310
„ „ Size of conductors for, 157
Indian telegraph service, 314
Indiana indignant, 242
Individual telephone call apparatus, Stephens's, 115, 223
Industrial Electrical Association, 267
Infallible timekeeper, 145
Influence of alternate heat and cold on metals, 6
Institute of Civil Engineers and electricity, 336
Instituting a comparison, 498
Insulation, High, 225
Intensity of the magnetic field in dynamo-electric machines, 449
International Cable Company, 528, 548, 572
„ telephone exhibition, 455
Inventor of the telegraph, 442
Inverse electromotive force of the voltaic arc, 298, 321
Is electric lighting reliable? 559
Isolated lighting in New England, 238

JABLOCHKOFF Company, 500, 549
Jarman's electrical tramcar system, 423
Jensen Electric Bell and Signal Company, 267
Jubilee of the telegraph, 528
Jubilee tower, 573
Judges and patents, 83, 94, 327
Judicial warping of patents, 46
Julien motor and storage battery, 530

KENNEDY'S electric light appliances, 551
Kensington Agricultural Hall, 477
Khotinsky accumulator, The, 572
Killed by electricity, 574
King's College Engineering Society, 549, 574
Krotophone, The, 156, 172

LABORATORY of the Gas Association for the study of electricity, 137
Lamps with carbon filaments, 327
Lalande-Chaperon battery, The, 69, 225
Lampholders, 315
Lancashire and Cheshire telephonic exchanges, 223
Large artificial submarine cable, 68
„ dynamo, 477
„ incandescent lamp, 337
Lauriol, Jules, on a comparison between different systems of transmitting motive power, 419
Law of winding self-regulating motors, 539
Lay torpedo, The, 551
Lecture, 573
„ experiments on transformers of electric energy, 351
LEGAL—
A. F. St. George, 532
Anglo-American Brush Electric Light Corporation *v.* Crompton & Co., 547
Bannatyne *v.* The Direct Spanish Telegraph Company, 451, 532
Brewis *v.* Pearse, 604
Burroughes *v.* The Loeb Chemical Electric Light Company, 604
Callow *v.* Young, 532
Cox *v.* Great Western Railway Company, 532
Direct Spanish Telegraph Company, 603
Edison *v.* Woodhouse and Rawson, 7, 38, 59, 89, 109, 138, 160, 172, 194, 216, 596, 621
Edison and Swan United Electric Lighting Company *v.* Holland and the Jablochkoff and General Electricity Company, 172
LEGAL—*continued*
Electric Sun Lamp Company *v.* Sir Coutts Lindsay and Company, 501
Field *v.* Bennett, 116, 173, 200, 604
Fuller and Son *v.* Buller, Jobson & Co., 295
Gilman *v.* The Gülcher Electric Light Company, 547
Harris *v.* Rothwell, 452
Huon *v.* Collet, 500
United Telephone Company *v.* Bassano and Slater, 13
„ „ Company *v.* Faulkner, 173
„ „ Company *v.* St. George, 65

Lecture on electricity, 530
„ on electroplating, 601
„ lantern, A new, 226
„ on magnets and electro-magnets, 432
Leicester Exhibition, Electrical exhibits at the, 118
Leonard, H. Ward, on the size of conductors for incandescent lighting, 157
Levy, M. Maurice, on the experiments of M. Marcel Deprez relating to the transmission of power, 163, 190, 215
"Liberty," The Bartholdi statue of, 240, 476, 526
Lighting of the Paris Post Office, 646
Lighthouse illuminants, 249, 315, 316, 550
Lightning accident, Curious, 457
„ Death by, 67
„ Cocoanut palms and, 181
„ The effect of, on human beings, 182
„ Freaks of a flash of, 242
„ holes in the High Alps, 241
List of installations put up by the Gülcher Company, 640
"Live and let live," 369
Liverpool Exhibition, 120, 351, 407, 430
Lockwood, T. D., On the necessity of protecting telephone exchanges, circuits and appliances from the destructive effects of intense electric currents and discharges, 357
Lodyguine glow lamps, 93
Long distance telephony in Austria, 117
Long projected trip, 241
Long-stroke expansion stationary steam engine, 207
Luxurious boat, A, 363
„ hairdressing, 432
Lycopodium, Experiments with, 41

MABERY, Prof. C. F., On the consumption of certain products from the Cowles electrical furnace, 372
Magnetic curves, Formation and fixation of, 229
„ escapement, A chronometer with, 2, 68
„ field in dynamo-electric machines, Intensity of the, 448
„ field, Variation of the, produced by an electro-magnet, 616
„ separator, Continuous action, 159
Magnetising force and core of magnet, A relation between, by E. L. French, 634
Make and break, A simple, 210
Management of accumulators, 531, 549
Manchester Jubilee Exhibition, 334, 434, 456
Map of the World, 267
Maquay battery, The, 95, 106, 119, 212
Marchant engine, The, 119, 240, 275, 294, 345, 363, 424, 441, 457, 475, 479
Marriage of Miss Spagnoletti, 68
Martin, T. C., on the operation of motors, 307
Maxim-Weston Electric Company, 570
Measuring the E.M.F. of the voltaic arc, 312
Measurement of the power absorbed by alternating current apparatus, 445
Medical applications of electricity, 293
„ electric apparatus, 199
Meeting of incandescent lamp makers, 172
Melting platinum standard of light, Experiments with the, 426
Menace to electric lighting, 27
Mild excitement, 317

Miners' lamps, 144, 225, 453
Modern substitute for the rack, 529
Monster electric clock, 364
Monopolists and private users, 41, 67, 118, 119
Monopoly, Incandescent lamp, 120
Monument to "the inventor of the telephone," 68
Mordey, W. M., on electro-motors and their government, 609
Motion for an injunction, 145
Motor, The Daft, 425
„ The Immisch, 457, 465, 469
Motors for electric lighting, 592
„ The operation of, from electric light and power stations, by T. C. Martin, 307
„ High praise for, 434
„ The law of winding self-regulating, 539
Mysteries of secondary batteries, 550

NATIONAL Telephone Company, 624
Natural water power and the electric light, 552
Naval uses of electricity, 93, 292
„ warfare, The electric light and, 205
Navigating the Suez Canal by the electric light, 466
Necessity of protecting telephone exchanges from effects of intense electric currents, 357
New application of electrical power, 47
„ cable manufactory, 432
„ electrical journal, 171
„ knight, 146
„ lecture lantern, 226
„ means of converting heat energy into electrical energy, 210
„ method of calculating the candle-power of arc lamps, 22

NEW COMPANIES—
Automatic Electric Railway Signal Company, 574
Blakey, Emmott & Co., 294
Chubut Company, Limited, 121
Electric Sewage Utilisation and Improvement Company, 502
„ Tramways Construction, 602
Equitable Telephone Association, 626
F. H. Perry & Co., Limited, 389
F. Williams, Limited, 121
George Forrest and Son, 410
Harrison's Synchronous Clocks Company, 603
John Fowler & Co., 199
Lay Torpedo Company, 552
Manchester Electric Supply Company, 575
Pacific Telegraph Company, 532
Patent Electric Fire Lighter Company, 480
Portuguese Hydrogen-Amalgam Company, 435
Regent Portable Electric Lamp and Lighting Company, 243
Singapore, Straits Settlement and Siam General Electric Company, 458
Standard Time Company, 458
St. James's Electric Light Company, 389
Taunton Electric Lighting Company, 626
Telegraph Manufacturing Company, 531
T. J. Howell, Limited, 532
Union Electrical Power and Light Company, 575
United River Plate Telephone Company, 626
Water Primary Battery Company, 647

New proof of the Wheatstone bridge, 208, 225
„ scale for tangent galvanometers, 294
„ switch room, 47
"New" telephone, The, 19
New „ repeater, 536
„ use of the duplex, 527
„ York underground wires, 146, 432
„ „ wires, Plan of the conduit for, 143
„ Zealand cable subsidy, 455, 497, 502
„ „ cables and Bulgaria, 528
Newcastle Exhibition, 241, 290, 458, 548
Newspaper science, 172
No more bridge jumping, 338
Notes from Scandinavia, 647
"Nothing new under the sun," 602
Novelties, Supposed, 267

OBITUARY—
Breguet, Louis Francois Clement, 77
Coope, Octavius Edward, 550
Guthrie, Dr., 456
Ocean bottoms, 601
OFFICIAL RETURNS OF ELECTRICAL COMPANIES—
Australasian Electric Light and Power Company, 199
Automatic Electric Railway Signal Company, 603
Blackpool Electric Tramway Company, 626
Blakey, Emmott and Company, 317
Bradford Mutual Electric Lighting Company, 22
British and Colonial Dermatine Company, 390
Bull's Power Company, 70, 243
Byng Telephone Company, 69
Coates, Macdonald and Company, 48
Colchester Electric Light and Power Company, 96
Consolidated Telephone Construction and Maintenance Company, 148
Daniel Judson and Sons, 227
Eastbourne Electric Light Company, 603
Edison-Gower-Bell Telephone Company of Europe, 200
Edison Indian and Colonial Electric Company, 48
„ and Swan United Electric Light Company, 227
Electric Apparatus Company, 269, 480
„ Metal Extracting, Refining and Plating Company, 200, 339, 502
Electro-Metal Extracting, Refining and Plating Company, 227
E. T. Syndicate, 575
F. H. Perry and Company, 401, 502
Fischer Electro-Amalgamator Company, 502
Foreign Pilsen Electric Light and Power Company, 172
Gas and Light Company of Portugal, 121
Globe Electrical and Engineering Company, 390
Gülcher Electric Light and Power Company, 70, 148
Harrison's Synchronous Clocks Company, 626
Hastings and St. Leonards-on-Sea Electric Light Company, 48
Hirsch, Greystock and Company, 227
Hydrogen Amalgam Company, 339, 435
Incandescent Electric Lighting Company, 603
Jablochkoff and General Electricity Company, 199
Jarman Electrical Company, 648
J. E. H. Andrews and Company, 243
John Fowler and Company, 226
Kensington Court Electric Lighting Company, 121, 410
Lancashire and Cheshire Telephonic Exchange Company, 603
Leslie Liardet, Limited, 317
Loeb Chemical Electric Light Company, 96, 390, 575
Manchester and District Edison Electric Light Company, 269
Mechanical Telephone Company, 70
Medical Battery Company, 410
Mexican Gas and Electric Light Company, 502
National Telephone Company, 269
New Electro-Amalgamator Company, 69
Northern District Telephone Company, 269
Pilsen-Joel and General Electric Light Company, 626
Primary Battery Company, 172, 575
Railway and Domestic Electric Lighting Company, 410
River Plate Telephone and Electric Light Company, 226, 435, 627
Ryland's Electro-Plating Company, 480
Scottish Vulcanite Company, 390
Self-Propelling Motor Syndicate, 435
Self-Winding and Synchronising Clock Company, 410
OFFICIAL RETURNS—*continued.*
Shipping Appliances Company, 317
Simplex Electrical Syndicate, 22
Singapore, Straits Settlement and Siam General Electric Company, 480
Sir Coutts Lindsay and Company, 435, 648
South of England Telephone Company, 317
„ Staffordshire Electric Lighting Company, 532
Standard Electric Light and Power Company, 575
„ Time Company, 603
Swan United Electric Light Company, 22
Telephone Association, 148
„ Company of Austria, 22, 269
„ „ of Egypt, 48
T. J. Howell, Limited, 575
Union Electrical Power and Light Company, 603
United River Plate Telephone Company, 648
„ Telephone Company, 172, 458
„ „ Company of the River Plate, 627
Universal Telephone Company, 121
West African Telegraph Company, 69
William Elmore and Company, 294
Woodhouse and Rawson Electric Contract and Maintenance Company, 294
Oh, shade of Izaak Walton, 171
Ohmart arc lamp, The, 297
Oldest installation in existence, 362
Operating an organ by electricity, 47
Operation of motors from electric light and power stations, by T. C. Martin, 307
Opinions differ, 171
Opposed patent, 352
Organ, An electric, 294
Origin of continuous-current transformers, 613
Otto engines at Prague, 618
Overhead wires, Accident from, 529
„ and underground wires, 315
„ wires, The utility of, 199

PACIFIC Telegraph Company, 639
Paint, Mr. Crookes's new, 363
Paraffin, Electric light *versus*, 583
Parallel system, 572
Paris and Brussels telephone intercommunication, 600
Paris electrician gone mad, A, 549
„ Universal Exhibition, 240, 434
Parker, G. W., on the adaptation of carbon pencils to different currents in arc lighting, 332
Patent claims, 407
„ An important, 501
„ law in Uruguay, 68
„ Office report, 337
„ Opposed, 352
Patentees please note, 433
Patents, Judges and, 83, 94, 327
„ Judicial warping of, 46
Pellatt, M. H., on an absolute electro-dynamometer, 635
Pentz, James A., on the transmission of power to the dynamo, 359
Perry, John, and Ayrton, W. E., on electro-motors and their government, 563
Personal, 226, 240, 268, 387, 408, 434, 500, 529, 530, 600, 624
Petroleum engines, 386, 407, 408, 499
Phelps telephone, The, 206
Photographic apparatus, 93
„ transparencies, The electric light and, 531
Photometric measurements, On a physiological condition affecting, 88
Physiological condition affecting photometric measurements, 88
Pieper's arc lamp, 2
Plan of the conduit for New York wires, 143
Plating process, The bright platinum, 251
Plymouth Gas Company, 646
Polarisation of resistance coils, 646
Police telegraphic system, 362
Pollak battery, The, 408
Pollak's regenerative element, 105
Polytechnic, 268, 316

Portable testing bridge, 55
Portrait of Dr. Guthrie, 529
Porte-Manville electric governor, 183
Post Office and the Government, 148
„ „ telegraphists, 548
„ „ and the telephone companies, 237, 313
Power absorbed by alternating current apparatus, Measurement of the, 445
„ from central stations, 83
„ in laboratories, 4
„ Transmission of, 85
Practical deductions from the Franklin Institute tests of dynamos, 515
„ notes concerning the construction, use and management of storage batteries, by A. Reckenzaun, 512, 583, 608
Predetermination of dynamo characteristics, 485
Preece and Willmot's electric light switch, 541
Present position of the electric lighting industry in Berlin, 526
Presentation, 479
Primary batteries, 1, 93, 529
„ „ electric lighting by, 233
„ „ Reports on, 103
„ battery tests, 22
„ „ Dierman's, 94, 148
„ „ lighting, 189
„ „ The Regent, 121, 197, 212
„ „ „ Upward, 48, 64, 146
Printing by electricity, 600
„ press, electricity and the, 387
Priority of the incandescence lamp, 239, 637
Prize competition, 600
„ „ for the best electro-motor, 142, 160
Projected installation, 408
Promenade concerts, 68
Proposed reduction of cable rates, 243
Prospects of submarine telegraphy, 129
Protection of submarine cables, 294, 314, 549, 571

QUEENSLAND telegraphs, 602
Queer faults, 93
Quixotic cure, A, 95

RAILWAY intercommunication, 226
„ signalling apparatus, 293
„ working, Electricity and, 511, 540, 584
Raising the price of gas, 573
Receiving telephone, A novel, 301
Recent improvements and advances in the application of electricity to railway working, 540, 584, 632
Reckenzaun, A., practical notes concerning the construction, use and management of storage batteries, 512, 583, 608
„ tramcar system, 337
Regenerative element, Pollak's, 105
Regent primary battery, 121, 197, 212, 241
Regulation of dynamos by the movement of the commutator, 350
Regulator, The Goolden-Trotter patent, 289
Reis articulating telephone, Some additional facts concerning the, 29
„ telephone, 275
Relation between magnetising force and core of magnet, by E. L. French, 634
Remarks on the second paper of Mr. Hughes regarding self-induction, 30
Report on the experiments of M. Marcel Deprez relating to the transmission of power, 163, 190, 215
Report on primary batteries, 103
„ on the Maquay battery, 107, 212
Researches in electro-dynamics, 550
Resistance coils, Correction for, 84
„ „ Polarisation of, 646

REVIEWS—
Analysis of tables for chemical students, by R. L. Taylor, 289
Arc and glow lamps, by Julius Maier, 211
Arithmetic of electrical measurements, by W. R. P. Hobbs, 644
Electric transmission of energy, by Gisbert Kapp, 42, 81

REVIEWS—*continued.*
Electricity and magnetism in antiquity, by Dr. Alfred Ritter von Ohbanitzky, 405
„ in the service of man, edited by R. Wormell, 384
Elements of electro-technics, by Eric Gerard, 290
Exercises on mensuration for junior students, by T. W. K. Start, 289
Gas for motive power, and for industrial uses, 289
Heroes of science: Physicists, by Wm. Garnett, 383
Laboratories of electro-technics, by August Neumayer,
Lives of the electricians: Profs. Tyndall, Wheatstone and Morse, by W. T. Jeans, 565, 589
Management of accumulators, by Sir David Salomons, 542
Note book and price list with useful formulæ, 450
Notes of lectures at the Liége Mining School, by Leon Demany, 290
Post Office telegraphs, 405
Practical treatise on electricity, by C. M. Gariel, 360
Short lectures to electrical artizans, by J. A. Fleming, 333
Theory of Magnetic Measurements, by F. E. Nipher, 566

Rheostat, Thomson's improved, 267
Right kind of home rule, 119
Royal Holloway College, 21
„ Jubilee Exhibition, Manchester, 334, 434, 457
Run to earth, 530
Runaway steam tramcar, 477

SAD occurrence, 407
Safety lamps in mines, 316, 317
Salomons, Sir David, on a new proof of the Wheatstone bridge, 208
Saltaire Exhibition, 455, 500
Sanitary Institute Exhibition, 500
Schlesinger tramway system, 477
School of Electrical Engineering, Hanover Square, 293, 573
Scientific experts as witnesses, 88
„ toys, 636
Sea bottoms and submarine cables, 137
Searching after the unattainable, 205
Secondary batteries, 385, 550
„ generators, 78
Secretary of State for Scotland on the telephone companies, 476
Self induction, Remarks on the second paper of Mr. Hughes regarding, 30
Self-regulating motors, The law of winding, 539
Separator, Continuous action magnetic, 159
Settle's patent electric lamps, 646
Severn Tunnel, The, 447
Sewage pumping by electricity, 602
Sextuplex telegraph, The new Field, 587
"Shallow" and the telegraph, 198
Shepard, Wm. E., and Cross, Chas. R., on the inverse E.M.F. of the voltaic arc, 298, 321
Shopping by telephone, 477
Short dynamo, The, 69
Shot firing in mines by electricity, 82
Siemens dynamo, 433
Signalling by gas, 338
Silvertown low resistance battery for electric lighting, 589
Simple make and break, 210, 239
Single needle instrument sounders, Gilbert's improved, 446
Siphon recorder, Improved Thomson's "Little," 56
Smith abroad, Mr. Holroyd, 502
Smoking concert, 501
Snowstorm and the wires, The, 641

SOCIETIES—
American Society of Mechanical Engineers, 529, 478
Dynamicable Society, 551
Junior Engineering Society, 529
King's College Engineering Society, 549
Physical Society, 71, 528, 554, 574, 599
Royal Society, 93, 456, 477, 549
„ „ of Edinburgh, 68, 319

SOCIETIES—*continued.*
Society of Arts, 478, 500, 531, 550, 592
„ „ Engineers, 268
„ „ Telegraph Engineers and Electricians, 21, 456, 501, 504, 549, 555, 576, 605

Soldering by electricity, 624
„ iron, An electric, 573
Some additional facts concerning the Reis articulating telephone, 29
„ recent advances in telephony, 34
South Australian Postmaster-General, 20
Spanish International Exhibition, A, 387
Speaking condensers, Telephone circuit for, 444
Specific inductive capacity, 646
Specific inductive power and conductivity of dielectrics, 615
Spectacles, Electric, 549
Spiel's petroleum engine, 546
Sprague electric railway system, 398
Standard cell, Clark's, 549, 301
„ „ „ Temperature coefficient of, 560
„ of light, Experiments on the melting platinum, 426
„ resistance, 171
Stanhope telephone, The, 457
Statistics of the Telegraph Service, 234
Steam and steam engines, 574
Steam engine, New long-stroke expansion stationary, 207
Step in the right direction, A, 65
Stephens's individual telephone call apparatus, 115, 223
Stockholm Exhibition, The, 146
Stockwell electro-motor, 422
Storage batteries, 456
„ „ in America, 603
„ „ Practical notes concerning, by A. Reckenzaun, 512, 583, 608
Strange history of a dynamo, 14, 43
„ story, 530
Submarine boat, Another, 626
„ cable, Large artificial, 68
„ „ protection, 294, 314, 549, 571
„ cables, Sea bottoms and, 137
„ electric search light, 453
„ mining and electricity, 294
„ Telegraph Act, 493
„ telegraphy, Prospects of, 129
„ torpedo boat, 530, 574, 618
„ warfare, 550
Subway conduit, Electric, in New York, 418
Suggestion, A, 572
Suicide of a telegraph clerk, 527
Sun distributor box, 95
Supposed novelties, 267
Swan's safety lamp for miners, 386
Swinburne, Jas., on the Edison filament case, 129
Switch, A bell pull, 312
Switchboard telephone, 69
Sympathetic vibration of jets, 5
Switchboards, Woodhouse & Rawson's, 633

TAKING advantage of good nature, 68
Tangent galvanometer, The, 388
„ galvanometers, To adjust, 57
„ „ New scale for, 294
Technical education, 120
„ „ The Charity Commission and, 240
Technological examinations, 170
Telegrams, Australasian, 625
„ to China, 571
„ „ the Continent, 513
„ Eastern, 292, 314
„ Charge of tampering with, 530
„ Sixpenny, 314

TELEGRAPH—
Act, Submarine, 493
in Algeria, 121
arrangments, American, 117
at Berlin, 571
in Burmah, 224
cables of the world, 67
in China, 432
clerk, Suicide of a, 527
clerks, 269, 496
construction, Underground, 170
engineering, Dangerous, 365

TELEGRAPH—*continued.*
in Greece, 599
in India, 20, 314
Inventor of the, 442
in Italy, 571
Jubilee of the, 528
„ Exhibition, 574
linemen, 20
manager, A South African, 224
in Mayo, 314
messengers, Interfering with, 45
office at Truro, New, 624
plant in Canada, 407
posts, Gilbert's footsteps for, 377
revenue, 21
service, The, 560
„ Statistics of the, 234
sextuplex, The Field, 587
"Shallow" and the, 198
statistics for 1885, 617
v. the telephone, 645
Thief and fire detector, 612
at West Ham, 313
works on fire, 364, 388

TELEGRAPHIC—
breakdown, 499
communication with Australia, 313, 314
„ in Canada, 625
„ and the fisheries of the Western Highlands, 645
„ The gale and, 571
„ with light ships, 224
„ between Liverpool and Havre, 224
„ system, The police, 362
Telegraphing, Dilatory, 339
Telegraphist of the world, Champion, 224
Telegraphists, Charitable, 529
„ classification, 362
„ Post Office, 548
Telegraphs, Army, 294
„ Colonial, 66
„ Queensland, 602
„ Indian, 224
„ The weather and the, 601

TELEGRAPHY—
African, 20
Another inventor of, 20
Atlantic, The originator of, 20
Automatic, The use of condensers in, 231, 267
reform, 45
submarine, Prospects of, 129

TELEPHONE—
of 1664, A, 238
of 1868, A, 524
at an agricultural show, 19
in Austria, 117
Blenheim's patent, 294
a blessing, 527
call apparatus, Stephens's individual, 115, 223
circuits for speaking condensers, 444
companies, The Post Office and the, 237, 313
company and the Government, 148
„ of Paris, 58
Construction and Maintenance Company, 389
conversazione at Glasgow, 527
in Cumberland, 313
ear, The deaf, 144
exchange, West End, 476
Exhibition, International, 455
in France, 44
in government offices, 266
incident, Tragic, 548
intercommunication between Paris and Brussels, 600
inventor of the, Monument to, 68
in the Isle of Wight, 363
Lecture on the, 645
literature, 386
litigation, 338
manufacturing case, 477
Mesmerising by, 313
The "New," 19
in the North, 406
Novel receiving, 301
patent, The Bell, probably broken, 513
patents, American, 44, 239, 251, 339, 548, 607
„ English, 1
The Phelps, 206
at Plymouth, 572
at Portsmouth, 363, 455

TELEPHONE—*continued.*
at Preston, 548
The Reis articulating, 29, 275
relays, 560
repeater, A new, 536
Secretary of State for Scotland and the, 476
in Scotland, 266
Shopping by, 477
at Southampton, 19, 313, 363, 548, 599
and the stage, 599, 624
The Stanhope, 457
in Sweden, 223
system, The Van Rysselbergh, 572
v. the telegraph, 645
in "The Three Towns," 572
transmitter, Another, 389
Use of the, 599
in Venezuela, 198
Victorian Government and the, 572
in the West of England, 238, 388
working, 386
in York, 361

Telephones, Action respecting, 406
Telephonic apparatus, Early, 346
„ charges, English and American, 572
„ communication between Bourne- and Poole, 19
„ „ in the Isle of Wight, 197
„ development, 237
„ exhibits at the Birmingham Exhibition, 315
„ experiments, 19
„ progress at Bristol, 364
„ service, Rates of, 19
„ switchboards, 69
Telephoning between Paris and Brussels, 527
Telephony, Automatic call-boxes for, 324
„ Improvement of, 499
„ Long distance, in Austria, 117
„ Some recent advances in, 34
„ *v.* telegraphy, 364
Telpherage, 242, 268
Temperature coefficient of Clark's standard cell, by Arthur Dearlove, 560, 611
Terminals and wire-holders for rapid connection, 466
Test of an Edison central station plant, 551
Testing apparatus, Electrical, 159
„ bridge, Portable, 55
„ dynamos, 640
Thames conservancy and electric bills, 529
Thermometry, Electric, 326
Thief and fire detector telegraph, 612
Thomson incandescent dynamo, 373
Thomson-Houston electric lights, 406
Thomson's "Little" siphon recorder, An improved, 56
„ improved rheostat, 267
Thorpe's new electric light switch, 646
Thrashing corn by electrical power, 267
Throwing stones at an electric car, 145
Thunderstorms, 93, 118
Time ball for Bradford, 45, 373
Timekeeper, An infallible, 145
Time-saving system, 552
Timing bicycle races by electricity, 86
Too much light! 95
„ „ „ at Hell Gate, 338
Torpedo, The Lay, 551
Torpedoes, The value of, 478
Town lighting, 337
Tragic telephone incident, 548
Tramway conductors extraordinary, 574
Tramways and electricity, 640
Train signalling by electricity, 339
Tramcar driving, 226
Transatlantic cables, 352
Transformers, Efficiency of, 80
„ The Gaulard and Gibbs, 592
Transit tables, Clark's, 600
Transmission of power, 85, 171, 450, 457, 500, 541, 601
„ of power to the dynamo, by James A. Pentz, 359
„ of power in New Zealand, 134, 145
„ of power, Report on the experiments of M. Marcel Deprez relating to the, 163, 190, 215
Transmitting motive power, A comparison between the different systems of, 419
Trial of Davey-Paxman engine, 434
Tricycle, An electric, 95
Trotter's dioptric glass, 433
Turbines, 477
Twigging the red light, 626

UNATTAINABLE, Searching after the, 205
Underground conductors, 417
„ „ The distribution of electricity by, 422
„ telegraph construction, 170
„ wires in New York, 146, 432
Unfair competition, 408
United States correspondence, 498
„ Telephone Company, 117, 223
University College, Bristol, 292
„ „ Dundee, 267
Unsuspected dangers with frictional electricity in blasting, 537
Upward primary battery, 48, 64, 146
Uruguay patent law, 68
Use of condensers in automatic telegraphy, 231
Utilisation of wind power for electric lighting, 143
Utilising waste steam, 47
Utility of overhead wires, 199

VALUABLE contact detector, 363
Value of torpedoes, 478
Van Rysselbergh telephone system, 572
Variation of the magnetic field produced by an electro-magnet, 616
Vast field, 147
Very true, 145
Victorian Government and the telephone, 572
Vienna Opera house, 550
Visit to the works of the Anglo-American Brush Corporation, 234
Volk's railway again damaged, 647
Volta, The, 199, 268, 316, 433
„ prize, The, 430
„ Voyage of the, 273
Volta Pavia battery, The, 240
Voltaic arc, Inverse E.M.F. of the, 298, 321
„ „ Method of measuring the E.M.F. of the, 312
Voltmeter, Calibration of a Cardew, 132
Voyage of the *Volta*, 273

WATCHES, The demagnetisation of 403
Waterbury watch, The, 240, 292
Weather and the telegraphs, The, 601
Webber, Major-General, C.E., on glow lamps, 593
Weber, Prof. H. F., on Hughes's second paper on self-induction, 30
Welding by electricity, 274, 601
Wenzel's arc lamps, 157
West African cables, 21, 45, 53, 117, 145, 170, 224, 239, 292, 336, 362, 499
Western Union Telegraph Company, 67
What is a battery patent worth? 229
What is a filament? 94
What *Money* thinks, 241
What was it? 600
What's in a name? 147
When doctors disagree, 441
Where was the lightning rod? 241
White, J. Gilbert, on the heating of aerial conductors, 185, 379, 493
Wheatstone bridge, New proof of the, 208, 225
Whitecross Wire and Iron Company, 225
Whitworth scholarships, 170
Why the compass went wrong, 500
Wild Scheme, A, 546
Wind power for electric lighting, Utilisation of, 143
Winding self-regulating motors, The law of, 539
Wire manufacture, American, 572
„ tester, A, 118
Wonders will never cease, 500
Woodhouse and Rawson's switchboards, 633
Work performed in telegraphing, 171
Worm gearing, 575
Wrong use of an electric light pole, 221

INDEX—SPECIFICATIONS.

1885.

ABEL, C. D. (10231. Communicated by La Société Générale des Téléphones, of Paris), 153
" " (9706. Communicated by J. C. Pürthner, of Vienna), 270
" " (14337. Communicated by La Compagnie de Fives-Lille, of Paris), 576
Addenbrooke, G. L., and Ferranti, S. Z. de (14917), 629
Anders, G. L. (11056), (11057), 270; (13269), 576
Armstrong, J. T. (14383), 604
Atkins, G. J. (14986), 629
Arnoult, G. (9903), 152

BAILY, R. M., and Grundy, A. (14742), 649
Barlow, W. A. (13422. Communicated by Marcel Sappey, of Paris), 628
Bastie, F. B. A. R. De la, and Flotron, E. (14633), 649
Borel, F., and Paccaud, E. (11051), 366
Bosanquet, C. J., Cameron, W., and Tomlinson, W. A. (12096), 576
Brin, A. (11381), 244
Brockie, J., and Pell, B. (12681), 482
Brookes, A. G. (8923. Communicated by J. L. Huber, of Hamburg), 270
" " (10257. Communicated by J. L. Huber, of Hamburg), 366
Bucknill, J. T. (12915), 412

CAMERON, W., Tomlinson, W. A., and Bosanquet, C. J. (12096), 576
Carson, C. L. (14695), 628
Cassel, H. R. (8574), 227
Cauderay, J. (13704), 554
Chadburn, W. (15324), 629
Clark, A. M. (14354. Communicated by the Electrotechnische Fabrik Cannstatt, of Germany), 437
" " (14633. Communicated by E. Flotron and F. B. A. R. De la Bastie, of France), 649
Clarke, C. L. (11898), 50
Clerc, L. (13416), 482
Coleman, A. (8491), 227
Crossley, L. J., and Hicks, J. J. (13201), 342
Currie, S. C. C., and Timmis, J. A. (9108), 99

DALZIEL, A. (10384), 227
Davies, J. H. (11615), 482
" " Woodhouse, O. E., and Rawson, F. L. (11707), 508
Desruelles, L. A. W. (9415), 71
De Benardos, N., and Olszewski, S. (12984), 576
Drake, B. M., and Gorham, J. M. (15658), 629
Dunn, A., and Hasslacher, F. (14612), 437

EADIE, A., and Tannahill, J. (15794) 629
Edison, T. A. (7582), 50
Electrotechnische Fabrik Cannstatt (14354), 437
Elieson, C. P. (9522), 152
Ellery, H. G., and Gent, J. T. (10891), 243; (11659), 342
Emmens, S. H. (10011), 153

FAHNEHJELIN, O. (7573), 98
Farbaky, S., and Schenck, S. (13697), 604
Featherstonhaugh, A. (12360), 412
Fraser, E. J. (11153), 295
Ferranti, S. Z. de, and Addenbrooke, G. L. (14917), 629
Flotron, E., and Bastie, F. B. A. R. De la, (14633), 649

GAULARD, L., and Gibbs, J. D. (11331), 366
Gent, J. T., and Ellery, H. G. (10891), 243; (11659), 342
Gibbs, J. D., and Gaulard, L. (11331), 366
Giraud, F., and Nee, E. (10538), 153
Gisborne, F. N. (11525), 318
Goolden, W. T., Scott, R. A., and Trotter, A. Pelham (13478), 482
Gorham, J. M., and Drake, B. M. (15658), 629
Gravier, A. I. (8747), 152
Grundy, A. (13873), 533
" " and Baily, R. M. (14742), 649

HADDAN, H. J. (9896. Communicated by K. Pollak and G. Wehr, of Berlin), 152
" " (9199. Communicated by R. Walther and B. H. Walther, of Germany), 243
Haig, F. T., Howard, G. B., Howard, B. F., and Haig, T. L. (13721), 533
Handford, T. J. (7582. Communicated by T. A. Edison, of America), 50
" " (9526. Communicated by F. J. Sprague, of New York), 152
" " (9527. Communicated by F. J. Sprague, of New York), 227
Hasslacher, F., and Dun, A. (14612), 437
Hicks, J. J., and Crossley, L. J. (13201), 342
Hopkinson, J., and Hopkinson, E. (12084), 576
Houghton, E. J. (13744), 576
Howard, G. B., Howard, B. F., Haig, F. T., and Haig, T. L. (13721), 533
Huber, J. L. (8923), 270; (10257), 366
Hughes, T. V., and Rowland, C. (11876), 482
" " and Maxwell, W. (13485), 533

JOHNSON, J. H. (9415. Communicated by L. A. W. Desruelles, of Paris), 71
Johnson, J. H. (8743. Communicated by La Société P. Barbier and Cie., of Paris), 99
" " (8744. Communicated by La Société P. Barbier and Cie., of Paris), 152
" W. C., and Phillips, S. E. (11064), 244; (15601), 629
" J. Y. (13697. Communicated by S. Farbaky and S. Schenck, of Hungary), 604
Johnston, W. P. (10951), 243
Jolin, P., and Thompson, S. P. (13828), 533
Jones, T. J. (11454), (11652), 342
Justice, P. M. (11571. Communicated by H. C. Spalding, of America), 319
" " (11572. Communicated by H. C. Spalding, of America), 319
" " (11574. Communicated by H. C. Spalding, of America), 319
" " (11573. Communicated by H. C. Spalding, of America), 342
" " (11570. Communicated by H. C. Spalding, of America), 391
" " (11569. Communicated by H. C. Spalding and P. McMackin, of America), 342

KENNEY Electrical Cash Carrier Company (13551), 649
Kent, H. A. (11265), 295
Klan, V., and Spurny, F. (13810), 533

LAHMEYER, W. (9325), 270
La Compagnie de Fives-Lille (14337), 576
La Société Générale des Téléphones (10231), 153
La Société P. Barbier & Cie. (8743), 99; (8744), 152
Lake, H. H. (10646. Communicated by S. F. Van Choate, of New York), 318
Lake, W. R. (13551. Communicated by the Kenney Electrical Cash Carrier Company, of America), 649
Lee, R. A. (8622), 152
Lenaerts, L., and L'Ollivier, H. (10832), 227
Liardet, J. E. (9762), 270; (12724), 391
Link, A. F. (9029. Communicated by L. Scharnweber, of Kiel), 99
L'Ollivier, H., and Lenaerts, L. (10832), 227
Lorrain, J. G. (10370), 153; (15147), 649

MAXWELL, W. (13639), 533
" " and Hughes, T. V. (13485), 533
McMackin, P., and Spalding, H. C. (11569), 342
Miles & Co. (10126), 153
Millar, A. (14213), (14214), 534
Mordey, W. M., and Watson, C. (12982), 553

Moseley, C. (11307), 318
Muirhead, A., and Wright, C. R. A. (9580), 152
Muirhead, F. L. (7074), 98

NEE, E., and Giraud, F. (10538), 153

OLSZEWSKI, S., and De Benardos, N. (12984), 576
Owen, R. G. (8987), 99

PACCAUD, E., and Borel, F. (11051), 366
Parker, T. D. C., and Rees, J. P. (13694), 628
Pell, B. (15285), 629
„ „ and Brockie, J. (12681), 482
Phillips, S. E., and Johnson, W. C. (11064), 244; (15601), 629
Pitt, G. (13704. Communicated by J. Cauderay, of Neuilly), 554
Pollak, K., and Wehr, G. (9896), 152
Pryor, R. (10126. Communicated by Messrs. Miles & Co., of Christchurch, New Zealand), 153
Pürthner, J. C. (9706), 270

QUARTERMAN, W. H. (9217), 156

RADCLIFFE, J. (14156), 628
Rae, J., and Simpson, J. C. (11850), 391
Ravenshaw, H. W. (9601), 270
Rawson, F. L., Woodhouse, O. E., and Davies, J. H. (11707), 508; (15422), 629
Rees, J. P., and Parker, T. D. C. (13694), 628
Ridout, R. H. (9274), 152; (12110), 391
Riley, J. (12325), 342
Rogers, J. K. (13543), 482
Romanze, O. (7390), 125
Rosebrugh, A. M. (9962), 153; (9741), 366
Rowland, C., and Hughes, T. V. (11876), 482

SCHANSCHIEFF, A. (12378) 244,
Scharnweber, L. (9029), 99
Schenck, S., and Farbaky, S. (13697), 604
Schuckert, S. (14963), 629
Scott, R. A., Goolden, W. T., and Trotter, A. P. (13478), 482
Seel, C. (15325), 342
Sellon, J. S. (14129), 554
Sharrock, S., and Sharrock, F. G. (12623), 412
Simpson, J. C., and Rae, J. (11850), 391
Sinclair, D. (8703), 99
„ „ and Smith, D. J. (12600), 227
Skinner, W. (11525. Communicated by F. N. Gisborne, of Ottawa), 318
Slatter, A., and Sledge, J. S. (9128), 125
Sledge, J. S., and Slatter, A. (9128), 125
Smith, D. J., and Sinclair, D. (12600), 227
„ M. Holroyd (12230), 391
Spalding, H. C. (11571), (11572), (11574), 318; (11573), 342; (11570), 391
„ „ and McMackin, P. (11569), 342
Sprague, F. J. (9526), 152; (9527), 227
Spurny, F., and Klan, V. (13810), 533
Stephen, J. (13696), 482
Swinburne, J. (12001), 576

TALL, I. (12266), 391
Tannahill, J., and Eadie, A. (15794), 629
Thame, H., and Thame, J. R. (12288), 412
Thompson, N. G. (10817), 227; (11566), 366
„ S. P. (9530), 227; (11120), 295; (11500), 318; (11501), 366; (13343), 533
„ „ and Jolin, P. (13828), 533
„ W. P. (11898. Communicated by C. L. Clarke, of New York), 50
Thompson, W. P. (10832. Communicated by L. Lenaerts and H. L'Ollivier, of Brussels), 227
Timmis, I. A., and Currie, S. C. C. (9108), 99
Tomlinson, W. A., Bosanquet, C. J., and Cameron, W. (12096), 576
Trotter, A. Pelham, Scott, R. A., and Goolden, W. T. (13478), 482

VAN CHOATE, S. F. (10646), 318
Volk, M. (9388), 126

WADDINGTON, J. F. (12384), 576
Walther, R., and Walther, B. H. (9199), 243
Walton, F. (9436), 126
Watson, C., and Mordey, W. M. (12982), 553
Watt, H. (7869. Communicated by E. Weston, of America), 98
Wehr, G., and Pollak, K. (9896), 152
Westman, H. (10031), 227
Weston, E. (7869), 98
Whalley, A. (11513), 342
Willans, P. W. (10180), 270
Wilson, T. B. (13015), 482
Wise, W. L. (11850. Communicated by J. Rae, and J. C. Simpson, of Montreal), 391
Woodhouse, O. E., Rawson, F. L., and Davies, J. H. (11707), 508; (15422), 629
Wright, C. R. A., and Muirhead, A. (9580), 152

YEATMAN, F. F. (10122), 153

1886.

ACHESON, E. G. (7394), 245
Amet, E. H. (2452), 244
Anders, G. L., and the Stanhope Company (7990), 245
Armstrong, J. T. (398), 482; (10824), 650

BALDRIGE, G. W. (5093), 342
Banki, D. (4882), 50
Beale, A. M. A. (10451), 650
Berliner, E. (5276), 71
Bernstein, A. (3149), 459
Boult, A. J. (6035. Communicated by W. Marshall, of New York), 228
„ „ (9403. Communicated by Dr. O. Lugo, of America), 649
Brain, F. (3448), 228
Brown, F. H. (6044), 228
Brooks, D., jun., Tatham, W. P., Tatham, H. B., and Tatham, J. (5745), 126

CARDWELL, G. A. (1899), 228
Case, W. E. (4937), 71
Clark, A. M. (7407. Communicated by H. J. Smith, of America), 245
„ „ (3540. Communicated by La Société Scola et Ruggieri, of Paris), 482
Cumberpatch, G. (7616. Communicated by Messrs. Recordon and Company, of Geneva), 23

DANN, J. E., and Lapp, J. (4069), 71
Davies, A. H., Richardson, C., and Stanley, T. (741), 342

EDMUNDS, H. (1292. Partly communicated by H. S. Thornberry, of America), 228

FERREIRA, Luis de Moraes Gomes (8525), 23
Fraser, J. (7851), 649

GANNON, P. (5940), 342
Gates, W. L. (8501), 459
Ghegan, J. J. (10508), 650
Gott, J., and Kingsford, H. (6345), 342
Griffiths, J. E. (6599), 228

HAMLIN, E. B. (6416), 244
Helios Electric Light and Telegraph Construction Company (5611), 126
Herz, C. (6678), 482
Higham, E. T., and Higham, D. (7669), 343
Holt, H. P. (5273), 71
Howard, J. H. (2647), (2648), 244

INTERNATIONAL Dudley Signal Company (7031), 245

JOHNSON, J. H. (7329. Communicated by E. J. Mallett, of America), 245
„ J. Y. (6027. Communicated by the Volta Graphophone, Company, of America), 126
„ „ (6042. Communicated by the Volta Graphophone Company, of America), 228
„ „ (6047. Communicated by the Volta Graphophone Company, of America), 228
„ „ (6062. Communicated by the Volta Graphophone Company, of America), 244
„ W. S. (6669), 342
Jonsson, O. F. (8616), 605
Julien, E. (8881), 23
Justice, P. M. (5125. Communicated by S. H. Short and J. W. Nesmith, of America), 71
„ „ (7394. (Communicated by E. G. Acheson, of New York), 245

KENNEDY, R. (723), 71
Kingsford, H., and Gott, J. (6345), 342
Kirby, J. (8151), 459

LAKE, W. R. (4937. Communicated by W. E. Case, of America), 71
„ H. H. (5611. Communicated by the Helios Electric Light and Telegraph Construction Company, of Germany), 126
„ „ (5745. Communicated by W. P. Tatham, H. B. Tatham, J. Tatham, and D. Brooks, jun., of Philadelphia), 126
„ „ (2452. Communicated by E. H. Amet, of Chicago), 244
„ „ (6416. Communicated by E. B. Hamlin, of Chicago), 244
„ „ (6968. Communicated by J. F. Munsie and H. N. May, of Chicago), 245
„ „ (7031. Communicated by the International Dudley Signal Co., of America), 245

Lake, H. H. (7548. Communicated by J. F. Munsie and H. N. May, of Chicago), 245
„ „ (10451. Communicated by A. M. A. Beale, of America), 650
Landon, H. R., and Richards, R. (6690), 343
Lapp, J., and Dann, J. E. (4069), 71
La Société Scola et Ruggieri (3540), 482
Loeb, L. N. (2647. Communicated by J. H. Howard, of America), 244
„ „ (2648. Communicated by J. H. Howard, of America), 244
Lockwood, W. C. (9707), 605
Lugo, Dr. O. (9403) 649

MAIN, W. C., and Swete, O. R. (6167), 342
Mallett, E. J. (7329), 245
Marshall, W. (6035), 228
May, H. N., and Munsie, J. F. (6968), (7548), 245
Millar, A. (10030), 509; (10644), 650
Muirhead, A. (8376), 366
Munsie, J. F., and May, H. N. (6968), (7548), 245

NATION, W. B. (8808), 23
Nesmith, J. W., and Short, S. H. (5125), 71

PIEPER, H. (4133), 228
Powell, L. S., and Sellon, R. P. (1726), 459

RECORDON & Co. (7616), 23
Reed, A. H. (7003. Communicated by J. T. Williams, of America), 554
Retzins-Ekwall, C. (6692), 343
Richards, R., and Landon, H. R. (6690), 343
Richardson, C., Davies, A. H., and Stanley, T. (741), 342
Ritchie, R. O., and Thompson, A. (11054), 650
Rosebrugh, A. M. (4321), 459

SCHAEFER, F. (4491), 244
Sellon, R. P., and Powell, L. S. (1726), 459
Short, S. H., and Nesmith, J. W. (5125), 71
Smith, G. A. (7456), 245
„ H. J. (7407), 245; (7544), 459
Somers, R. M. (10630), 650
Spaulding, E. S. (9053), 649
Stanhope Company, and Anders, G. L. (7990), 245
Stanley, T., Davies, A. H., and Richardson, C. (741), 342
Swete, O. R., and Main, W. C. (6167), 342

TACY, S. H. (8786), 509
Tatham, W. P., Tatham, H. B., Tatham, J., and Brooks, D., jun. (5745), 126
„ W. P. (8881. Communicated
Thompson, A., and Ritchie, R. O. (11054), 650
„ S. P. (7860), 459
by E. Julien, of Brussels), 23
Thornberry, H. S. (1292), 228
Tongue, J. G. (8151. Communicated by J. Kirby, of Namar, Belgium), 459

VOLTA Graphophone Co. (6027), 126; (6042), (6047), 228; (6062), 244

WILLIAMS, J. T. (7003), 554